FABRIC DISPLAY

The present invention relates to visual fabric articles intended to permit the display of a certain pattern or design. More specifically, the present invention relates to a visual fabric display system that may be implemented in an article of clothing, furniture, or in other location to provide communication and informational or decorative display by the action of electrostatic charges.

The idea of dynamically changing the appearance of the fabric of a garment, for example, is highly desirable and certainly attractive for designers and the fashion industry. There are a number of display devices that utilize informational and decorative manipulatives. Attempts so far include embedded LEDs, thermochromic liquid crystal, and electroluminesc ent materials applied to the fabrics. However, these techniques employ additional manufacturing efforts and costs.

As described in detail below, it has been found efficacious to use electrostatic charges applied to an area of fabric to realize visual display, and unlike prior art they do not involve the use of additional devices.

The present invention discloses a display fabric system, which includes a fabric layer having at least one conductive layer therein for passing an electrostatic field and a pl urality of surfaces having a plurality of furs on the surface thereof, so that selective regions covered by the furs can selectively extend out of the fabric layer in a substantially vertical orientation in response to the electrostatic field, thereby revealing the surface color of the fabric layer. In operation, an electric field is generated by the activation of a user via a conductive layer, so that the selected regions covered by the furs can repel each other and extend out of the fabric layer in a sub stantially vertical direction. The fabric surface may comprise a plurality of different color surfaces.

According to one aspect of the invention, a garment or furniture of desired form and function can be constructed in a conventional manner using readi ly available fabrics and materials, and the fabrics serving as a visual display system can be positioned advantageously within a wearable garment or furniture that permits easy manual activation by a person.

According to another aspect of the invention, the garment comprises a shirt, a hat, a jacket, a vest, a fashion accessory or the like.

Figure 1 illustrates an embodiment of a fabric display system in accordance with this invention.

Figure 2 illustrates a side view of the fabric layer of Figure 1 in accordance with the embodiment of this invention.

In the following description, for purposes of explanation rather than limitation, specific details

are set forth such as the particular architecture, interfaces, techniques, etc., in order to provide a thorough understanding of the present invention. For purposes of simplicity and clarity, detailed descriptions of well-known devices, circuits, and methods are omitted so as not to obscure the description of the present invention with unnecessary detail.

Referring now to Figure 1 of the drawings, a fabric display system 10 in accordance with this invention includes a fabric layer 14 having a flexible layer 12 of conductive material mounted thereunder. On the top surface of the fabric 14, a fur-like or hair-like 16 is formed thereof (hereinafter referred to as "fur"). The conductive layer 12 may be coupled to a power source in the form of loops to transmit the desired voltage level in conjunction with a user activation switch in any well-known manner, so that a fur-like surface coupled to an electrical power source is able to electrostatically charge the area of the fur-like surface causing a local change in the orientation of the fur.

The embodiment illustrated in Figure 1 may be incorporated in the form o f a conventional sleeveless top shirt, hat, or a short or long-sleeved vest or jacket, for example. In an alternate embodiment, the embodiment of Figure 1 may be implemented in furniture or in other locations where the layers of electrically conductive layer 12 can be used as a coupling of electrical power for visual display purposes.

Referring to Figure 2, the furs 16(b) are resting nearly flat and covering most of the surface of the fabric 14 in the normal state. When a given surface of the fabric 1 4 is electrostatically charged through the activation by the user, then the furs 16(b) repel each other and also are repelled by the surface, therefore standing nearly vertical to the surface and revealing the color of the surface. Discharging of an area causes the fur to rest back in their initial position. The charged layer 12 can carry either a positive or negative charge on its outwardly-facing surface in such a way that electrostatic forces that exist in the surface force the furs 16 to repel and ext end out of the surface in a substantially vertical orientation, thereby revealing the color of the surface.

The surface of fabric 14 may be divided into a number of predetermined patterns and different colors. Hence, the pattern is determined by the fab ric surfaces of different colors as well as the orientation of pieces of fabric that make up the pattern. For example, each area can be considered as a pixel and therefore charging/discharging different areas, a change in the contrast can be achieved whic h can form a binary image or pattern.

The material of the fabric layer 14 can be either natural or synthetic, and the fabric created from such materials can be either woven or sheet-formed in any well-known manner. For example, the fabric layer 14 can be formed of a material such as cotton, polyester, spandex, a combination thereof, or the like. Alternatively, the fabric layer 14 can be constructed from non-woven (felted) or knitted fabrics or a composite structure. However, in each alternative case, e lectrically conductive layer 12 is included

in the production of the fabric, thus providing electrically conductive layers. The conductive layer 12 may be produced by printing them onto the fabric layer 14 or it may be mounted as adhesive tape. Alternatively, the conductive layer 12 may be produced by printing a material containing conductive particles onto the fabric layer 14. All of the alternatively described methods provide a suitable bond, forming a reliable electrical connection.

While the preferred embodiments of the present invention have been illustrated and described, it will be understood by those skilled in the art that various changes and modifications can be made, and equivalents can be substituted for elements thereof without departing from the true scope of the present invention. Thus, the shape of an interconnect system in the drawings should not impose limitations on the scope of the invention. Therefore, it is intended that the present invention not be limited to the particular embodiment disclosed as the best mode contemplated for carrying out the present invention, but that the present invention include all embodiments falling within the scope of the appended claims.